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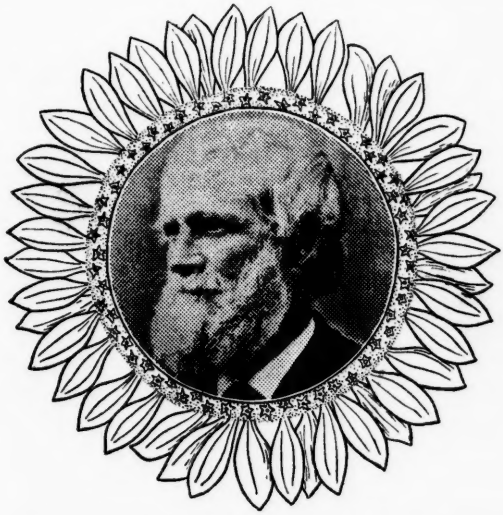

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SYNOPSIS OF THE FAMILY CERCOPIDAE (HOMOPTERA) IN NORTH AMERICA.

BY

*KATHLEEN C. DOERING, Lawrence, Kansas.**

HISTORICAL REVIEW.

The family Cercopidae was described by Leach in the Edinburgh Encyclopedia Vol. IX (1815) as the group Cercopida. Linnaeus first described various species of Cercopidae but placed them under the genus **Cicada.** In 1775 Fabricius described the genus **Cercopis** and put all the species under this. However Leach (1815) and Amyot and Serville (1843) are responsible for giving the characteristics of the family. The six genera occurring in North America north of Mexico are **Tomaspis** and **Lepyrohia** described by Amyot and Serville in 1843, **Aphrophora** described by Garmar in 1821, **Clastoptera** described by Germar in 1838, **Philaenus** described by Stal in 1864, and **Philaronia** described by Ball in 1898.

DESCRIPTION OF THE FAMILY.

Body stout, compact; general form oval or elongate with head in nearly the same plane as body; postclypeus convex, or produced and compressed on either side, more or less inflated; ocelli two, situated on vertex and near its posterior margin; vertex nearly flat; front flattened and forming a subquadrate insertion in anterior margin of vertex (except **Clastoptera**); antennae short, inserted on the genae between the eyes, the basal segments forming a short stump, remainder setaceous. Pronotum large, hexagonal or trapezoidal with a notch on posterior margin and anterior margin straight or angularly rounded. Elytra nearly always coriaceous, pubescence variable. Scutellum small or medium in size, triangular. Legs remote from sides of body; coxa short, tibia cylindrical bearing two stout spines (rarely one) on outer side and a crown of short spines around apex; two basal segments of tarsus terminated by a crescentic row of spines, third having a bifid claw.

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Comparative Notes;

The family very closely resembles the Fulgoroidea and the Jassoidea group. It is easily separated from the first of these by the place of insertion of the antennae. In the Fulgoroidea the antennae are inserted on the sides of the face beneath the eyes while in the Cercopidae they are located on the genae between the eyes. From the Cicadellidae the Cercopidae can be distinguished by the fact that the former have a double row of spines down the length of the hind tibia while the Cercopidae have only two stout lateral spines and crown of spines around apex of tibia.

KEY TO SUB-FAMILIES

(See Plate I, Figs. 8 and 9).

A. Anterior margin of pronotum straight; eyes equally long and broad; head narrower than pronotum; apex of elytra distinctly reticulated. **Cercopinae** Stal.

AA. Anterior margin of pronotum rounded or angular; eyes frequently transverse; head equalling or almost equalling the pronotum in width; apex of elytra rarely reticulated ..... **Aphrophorinae** Stal.

Sub-family Cercopinae.

The limits of this subfamily and the status of the genera in it are rather doubtful. This is due to the fact that Amyot and Serville (1843) divided the old genus **Cercopis** of Fabricius into six genera, namely, **Cercopis, Rhinaulax, Tomaspis, Triecphora, Monecphora** and **Sphenorhina.** Many subsequent workers have been unable to follow them in this division while a few agree to the division. Stal who was the leader for the first group placed **Tomaspis, Triecphora, Monecphora** and **Sphenorhina** under one genus **Tomaspis** on the grounds that the character used by Amyot and Serville, namely the relative prominence of the carina on the postclypeus was not a sufficiently strong generic character. Fowler (Centrali-Americana) agreed with Stal's classification since he found such intermediate forms that no hard and fast line could be drawn between Amyot and Serville's genera. Lallemand (Genera Insectorum) adopts the genus **Tomaspis** with two subgenera **Tomaspis** and **Triecphora.** Distant agrees with Stal in suppressing **Triecphora** and **Monecphora** but keeps **Sphenorhina** for convenience sake since it is easily recognizable. Fowler did not agree with Distant about **Sphenorhina** because

according to him the three feeble carinae that distinguish this group are often very weak and as Amyot and Serville themselves stated are by no means always visible.

Opposing this school of belief are Oshanin who lists **Triecphora** in his catalogue of European Homoptera and Van Duzee (1919). The latter makes the following statement:-

"I can see nothing to be gained by uniting the four genera of Amyot and Serville, **Tomaspis, Triecphora, Monecphora,** and **Sphenorhina** as was done by Stal. While closely related their general facies and distribution are sufficiently distinct and they have as good a right to be distinguished as many of the generally ac cepted genera. It seems to me that a series of species in any of the larger generic groups which separates out from the others in a synoptical key by some clearly defined character is entitled to generic standing if a student wishes to so designate it. In many cases other students would doubtless call such a series a subgenus but in larger plastic groups where nature absolutely refuses to draw a distinct line of demarcation between the genera we must use such divisions as will most facilitate the determination of our species".

Apparently then the matter is at present only a question of opinion. Until a comprehensive study is made of the whole group and the genitalia studied we cannot be too sure. The writer, however, agrees with Stal's classification since the two groups **Cercopis** and **Tomaspis** are so readily separated by several easily recognized characters, while the other groups in question are only separated by the rather doubtful characteristic of the carinae. Moreover the carina on the specimens at hand of the species in question is certainly quite distinct which does not fit in with Amyot's and Serville's description of **Monecphora** in which they state "avec une seule carene faiblement saillante."

TOMASPIS AMYOT AND SERVILLE.
KEY TO SPECIES AND VARIETY.

A. Above dark brown to black with a narrow orange or black transverse band across humeral angles of pronotum and two slightly wider bands across elytra..... **Tomaspis bicincta** (Say).

AA. Above dark brown to black with bands partly or completely absent.
Tomaspis bicincta var. ignipecta Fitch.

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GENERIC SYNONYMS

Ball, E. D. Ent. News XXXIX, p 47, 1928. (As **Monecphora**).

Fitch, Asa. Trans. N. Y. St. Ag. Soc. XVI, p. 389, 1856. **(Monecphora).**

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SPECIFIC SYNONYMS.

Tomaspis rubra (Linn.) Fowler, W. W. Biol: Centr. Am., Homop., II, p. 183, 1897. (part)

Tomaspis bifascia Walk. Fowler, W. W. loc. cited, p 180, 1897.

Monecphora bifascia Walk. Walker, F. List Homop., III, p. 679, 1851.

Monecphora angusta Walk. Walker, F. loc. cited, p. 680, 1851.

Monecphora neglecta Walk. Walker, F. loc. cited, p. 683, 1851.

DISTRIBUTION

VanDuzee (1917) lists this species from Arkansas, Connecticut, Florida, Georgia, Iowa, Kansas, Louisianna, Maryland, Massachusetts, New Jersey, New York, North Carolina, Pennsylvania, Texas, West Virginia, Washington, D. C. Ball adds Wisconsin to this list. Stearns (1923) states that the variety **ignipecta** is an entirely northern form with a recorded distribution throughout the New England states except for Maine.

HOST PLANTS.

Doctor E. D. Ball gives us our only information as to the hosts and habitat of this species. He states, "In Florida this species occurs in grass clumps in damp areas and forms large frothy masses often partly below the level of the ground."

OCCURRENCE OF MONECPHORA SCHACH (FABR.)

Van Duzee lists in his catalogue **Monecphora schach** (Fabr.) as a North American form, owing to the fact that Fabricius described it as coming from "America septentrionalis". However other entomologists have not recognized this form or at least no recent records have been made of it. Van Duzee further states that it "may refer to some variety of **Monecphora bicincta** (Say)"

SUBFAMILY APHROPHORINAE

This subfamily corresponds to Stal's group **Cercopida**. Fowler (Centrali Americana) calls it **Ptyelinae** while Kirkaldy calls the group **Cercopinae.** The characteristics of the Subfamily are given in the above key.

KEY TO GENERA.

(See Plates 1, 2, 4, 5 and 6).

1. Apex of clavus acute, corium without a terminal membrane; form large or medium, elongate ..... 2.
   Apex of clavus blunt and broadly rounded, corium with a broad terminal membrane; pronotum transversely wrinkled; form smaller, globose..**Clastoptera**

2 (1). Form small or medium-sized; ocelli nearly equally distant from eyes and each other; labium short and stout, two segmented, reaching middle coxae only; vertex and pronotum without median carina .....**3.**

   (1). Anterior margin of pronotum angulate; ocelli

nearer each other than eyes; labium (rostrum) long, exceeding hind coxae in length and with three visible segments; vertex and pronotum distinctly carinate .....**Aphrophora**

(2). Anterior margin of vertex between eyes and front sulcate; pubescence variable .....4.

(2). Anterior margin of vertex between eyes and front compressed to a thin edge or not sulcate; densely pubescent above .....**Lepyronia.**

4 (3). Elytra with about five apical cells, usually easily distinquished; pubescence scarce ..... **Philaenus.**

(3). Elytra irregularly reticulated apically, venation not easily distinquished; pubescence dense .....**Philaronia.**

APHROPHORA GERMAR.

GENERIC DESCRIPTION.

Vertex, disc weakly convex or flattened, sloping, medially carinate, anterior margin between eyes and front sharply compressed; tylus broad, weakly carinate, broadly rounding, lateral margins convex; ocelli usually placed closer to posterior margin of vertex than to front, the distance between the two much less than distance from one ocellus and eye; front convex, inflated, transversely wrinkled except on median line; labium long, three-jointed, the last and longest segment exceeding the hind coxae; pronotum large, about twice longer than vertex, disc convex, sloping, medially carinate, anterior margin broadly, obtusely angulate, medially produced into a triangular notch on posterior margin of vertex between ocelli, lateral margins short, length about equal to distance between ocelli, posterior margin broadly, roundingly angulate; scutellum centrally depressed elytra, coriaceous, convex, twice longer than wide, apex roundingly angulate, costal margins expanded; wings, third vein (cubitus) from margin forked and forming a closed submarginal cell; entire dorsal aspect of insect coarsely and irregularly punctate; general color fuscous mottled with various shades of tan.

KEY TO SPECIES.

(See Plates 1, 2 and 3).

1. Elytra usually broadly convex with outer margins only slightly seen from above .....4.

strongly curved; postclypeus only slightly inflated, forming an acute angle with vertex and front; general aspect grayish brown with two more or less distinct hyaline areas on costal margins of elytra .....2.

Elytra elongate, convex, with costal margins more narrowly expanded; usually postclypeus strongly inflated and when so, forming a right angle with vertex; general color varying shades of fuscous, yellow and reddish brown with no hyaline areas on costal margins .....3.

2. (1) Size smaller, length not exceeding 8.5 mm.; narrower; general aspect dark grayish brown with hyaline areas of elytra distinct; eyes viewed dorsally twice as broad as long, postocular space reduced to a mere line ..... **Aphrophora quadrinotata** Say.

(1) Size large, length 10 mm. or over; broader; general aspect pale grayish brown with hyaline areas indistinct; eyes viewed dorsally one-third wider than long, postocular space not reduced to a mere line..... .....**Aphrophora angulata** Ball.

3 (1). Head on mid-dorsal line two-thirds as long as width between the eyes; postclypeus greatly inflated and produced beyond front as viewed from above .....**Aphrophora parallela** (Say).

(1). Head on mid-dorsal line not more than one-half as long as width between eyes; postclypeus never or only slightly seen from above ..... 4.

4 (3). Eyes distinctly twice wider than greatest length; postclypeus somewhat produced and inflated, meeting vertex at nearly a right angle .....5.

(3) Eyes equal in width and length or only slightly wider than long; postclypeus meeting vertex at distinctly an acute angle .....6.

5 (4). Postclypeus meeting front at a slightly acute angle; ocelli large, greatest diameter longer than space from ocellus to posterior margin of vertex; width of eye at least twice wider than lateral margin of pronotum .....**Aphrophora irrorata** Ball.

(4). Postclypeus meeting front at a right angle; ocelli smaller, space between ocellus and posterior margin of vertex equal or greater than diameter of ocellus, width of eye less than twice wider than lateral margin of pronotum ....**Aphrophora permutata** Uhler.

6 (4). Narrower than length of lateral margin of vertex; medial length of head one-half as long as distance between eyes .....7.

(4). Front wider than length of lateral margin of vertex; medial length of head less than one-half as long as distance between eyes. .....8.

7 (6). Posterior margin of pronotum angularly emarginate in front of scutellum; pronotum with a weak median carina on basal half; pronotum shining with punctures confluent..**Aphrophora canadensis** Walley.

(6) Posterior margin of pronotum broadly and roundly emarginate in front of scutellum; pronotal median carina broad, well defined and extending from base to apex; pronotum dull with punctures closely set and uniting to form a small scar on either side of posterior half **Aphrophora punctipes** Walley.

8 (6). Ocelli only very slightly nearer posterior margin of vertex than front; front, vertex and pronotum with a broad median pale stripe .....**Aphrophora saratogensis (Fitch).**

(6). Ocelli usually decidedly nearer posterior margin of vertex than front; front and vertex with at most only a narrow median pale stripe .....9.

9 (8) Head, narrower than greatest width of pronotum; lateral margins of pronotum distinctly divergent; elytra without oblique dark bands .....**Aphrophora princeps** Walley.

(8) Head broad, greatest width equal or slightly greater than greatest width of pronotum; lateral margins of pronotum parallel .....10.

10 (9). Length 10-11 mm.; color, light ochraceous, heavily mottled with brown; pronotum with reddish-brown stripe arising on either side the median carina, broadening considerably at claval margin. .....**Aphrophora annulata** Ball.

(9) Length 8.5-10 mm.; color, tawny brown to pale ochraceous, more or less unicolorous and no reddish brown stripe on pronotum as above.....**Aphrophora signoreti** Fitch.

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Walker, Francis. List Homop. III, p. 713, 1851 **(Ptyelus)** Loc. cited, IV, p. 1153, 1852 **(Ptyelus).**

SPECIFIC SYNONYMS.

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Lallemand, V. Genera Ins., fasc, p. 60, 1912.
Aphrophora quadrinotata Say.

Ptyelus cribatus. Walker, F. List Homop., III, p. 712, 1851.
Stal, C. Of. Vet. Akad. Forh:, XIX, p. 493, 1862.
Aphrophora parallela (Say).

Ptyelus detritus. Walker, F. List Homop. III, p. 713, 1851,
Stal, C. Of. Vet. Akad. Forh:, XIX, p. 493, 1862.
Aphrophora saratogensis (Fitch).

Ptyelus gelidus. Walker, F. List Homop. III, p. 714, 1851.
Stal, C. Of. Vet. Akad. Forh. XIX, p. 493. 1862.
Aphrophora saratogensis (Fitch).

DISTRIBUTION.

The genus has been collected from the following localities in North America; Arizona, Arkansas, California, Colorado, Florida, Georgia, Idaho, Illinois, Iowa,

Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, Utah, Vermont, Washington, West Virginia, Wisconsin, Ontario, Quebec, British Columbia and Nova Scotia.

Of the eleven species **Aphrophora quadrinotata** seems to be the most common especially in Eastern United States, Canada and the Central states. **Aphrophora parallela** seems to have the same distribution as the above. In the Snow collection, University of Kansas, there is a large series of both of these from Michigan. **Aphrophora saratogensis** and **signoreti** are two other eastern and central species, the latter being recorded in the literature only from New York, Ontario and North Carolina. Specimens of **signoreti,** however, are at hand from South Dakota and Michigan. **Canadensis** Walley has only been recorded from British Columbia. **Punctipes** and **angulata** have only been recorded from California. **Irrorata** seems to be limited to the Central states (Nebraska) and to the Rocky Mountain regions of Colorado, New Mexico and Arizona. **Permutata** is principally a far western species although specimens are at hand from Colorado and Michigan. While **annulata** is considered a western species by Ball but is recorded by Stearns as occurring also in New Hampshire and North Carolina.

HOST PLANTS.

Doctor Ball (1915) reports that the nymphs of **annulata** were found around the crown of **Artemisia ludoviciana** in Utah, and the nymphs of **angulata** were found in spittle masses under the enlarged sheaths of **Heracleum lanatum** (Giant Umbelliferae). Van Duzee (1914) took the adult of the latter on willow. **Quadrinotata** is collected from various plants and shrubs especially in wooded regions. Glover (1876) recorded it from grapevines in Maryland. Doctor R. H. Beamer took a large series of adults of **irrorata** on aspen in Arizona. The adults of **permutata, parallela** and **saratogensis** have all been taken frequently from pine while Doctor Beamer took a large series from spruce and VanDuzee records **parallela** from hemlocks. Among these three species Doctor Ball concludes that only the nymphs of **parallela** are pine-feeding since he (1901) found nymphs of **permutata** in clumps of **Chrysopsis villosa** and **Lupinus** sp. in Colorado and nymphs of **saratogensis** (1928) in

Florida on **Woodwardia virginica** (common ditch ferns). In both cases the nymphal host plants were necessarily near pine trees.

OCCURRENCE OF APHROPHORA SALICIS DEGEER IN NORTH AMERICA

Metcalf, Z. P. and Barber, G. W. Psyche, A Journal of Entomology 36; p. 51-56. 1929.

The authors recorded the occurance in 1921 of this common European species of **Aphrophora** on various species of willow growing in the Arnold Arboretum, Boston, Massachusetts. They were able to rear this species during 1923-1924. It had attacked fifty-three named species and varieties of **Salix.** They seem to think that eventually the species may spread and attack native as well as cultivated varieties of willow.

Comparative Notes: This species is of a uniform yellowish color, with prothorax, scutellum, and elytra closely and uniformly punctate with small black punctures, each set with a fine golden yellow hair.

CLASTOPTERA. GERMAR
GENERIC DESCRIPTION.

Form, small, globose, although extremely variable in size and color markings; head considerably wider than long, with the head and anterior part of pronotum at an angle with rest of body; vertex extremely narrow, slightly depressed transversely, anterior margin usually slightly carinated; ocelli placed midway between anterior and posterior margins of vertex, or nearer anterior margin than pronotum; eyes broad, on same plane with vertex; front extending cephalad beyond vertex in varying degrees, sometimes scarcely visible from above, in some forms equal to length of vertex; postclypeus not longitudinally carinated, inflated in varying degrees according to species; antennae inserted in deep cavities between eyes and postclypeus; pronotum convex, broader than long, transversely wrinkled, anterior margin broadly rounded, lateral margins divergent, posterior margin deeply emarginate; scutellum triangular, much longer than wide; hemelytra pubescent, convex, deflected posteriorly, clavus with apex broadly rounded, corium terminating in a hyaline membrane, sometimes apical portion of corium also more or less hyaline with a conspicuous, usually protruding, callous spot near apex. Posterior tibia, with a single terminal row of spines;

ovipositor and male genital plates usually bent dorsad at an angle to rest of body. Female pygofer short and convex, length about equal to greatest width, outer margin rather broadly rounded at base, abruptly indented before apex, exceeded but slightly by the ovipositor; male, last ventral segment very short and convex, outer margins expanded, inner margins attingent to before apex, where they diverge slightly to form rounded lateral angles; males usually smaller and more sombre colored than the females.

(CONCLUDED IN NEXT ISSUE)

NOTES ON THE COCOONING HABITS OF GYRINUS*

BY

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The following notes are based upon observations made in Cheboygan County, Michigan, during the summer of 1929. Most of the observations were made on Burt Lake, a body of water near the camp of the Biological Station at Douglas Lake.

Between June 26 and August 17, numerous Gyrinid cocoons were found attached to Scirpus and Typha stems, or any other support projecting above the water. These cocoons are oval in shape, approximately ¼ inch long and ⅛ inch wide, of grayish color, and of paper like texture. They are generally attached lengthwise to their support, and are located from two inches to four feet above the water's surface. In the majority of cases, they are attached near the highest point of their support, but many are found quite close to the water.

It was some time after I observed the completed cocoons before I was able to discover how or when they were formed. Diligent and prolonged search during the day time did not locate any larvae either crawling about the stems above the water or engaged in cocoon building. This seemed strange because cocoons were abundant and suggested that the work might be done at night, but several night observations, with the aid of both electric and carbide spot lights, failed to reveal any of the larvae at work. However, by removing all

*Contribution from Biological Station, University of Michigan.

cocoons from a marked patch of the reeds, and visiting same both morning and evening, and removing the cocoons again, it soon became evident that the work of cocoon construction was accomplished sometime between dusk and daylight. With this indication, it was not difficult to discover that the larvae were actively engaged in case-forming in the early morning hours between dawn and bright sunlight, which was from 4:00 to 7:30 A. M. At no other period of the day were the larvae observed at this work.

The cocoons are constructed from the dark brown, flocculent material which collects upon the surface of the reeds near the water line, and which, when dried, is of the same general grayish color as the cocoon. This material is gathered by the larva with its mandibles and placed in a lump on its back, between the first and fifth abdominal segments. This is accomplished by arching the head backwards over the body. When collected, this material is damp and slightly pliable, but the larva apparently adds some mucilaginous substance to the mass as it is gathered, giving it a distinct plasticity, and a semi-viscous nature, as is evidenced when the case is being formed.

In the act of gathering the material the larva crawls up and down the stem. When a sufficient mass is collected and a proper place selected, the load is shifted to the posterior part of the abdomen by an almost imperceptible series of body tremors. Then the larva turns so that it is head-downward on the stem, and attaches the mass to the support by reaching back with its head and working with the mandibles. The caudal end of the body is kept beneath the mass until the actual entrance is under way.

After attachment of the mass to the support, an opening is formed in it with the mandibles at a spot which is approximately the dorsal center. The head is then forced in this opening and is slowly pushed further into the mass of material. Ingress is continued thru this opening, the body going through a spiralling or "corkscrewing" movement, until entrance is completed. While entry is taking place, the material is apparently pushed into shape by the head from within, as in some cases I have seen the head pushed entirely thru the mass, but of course, it was quickly withdrawn, and the breach repaired.

After the last abdominal segment is withdrawn from beneath the mass and disappears through the dorsal opening, the larva reaches up with its head and closes the entrance with its mandibles. For some time after the opening is sealed the larva is apparently working at final modeling or shaping up of the chamber, and getting into position within the cocoon, as is indicated by the repeated rising and falling of the outer surface of the cocoon. It is interesting to note that after the cocoon is completed the larva is always found resting in the same position, namely, curled up in the shape of the letter C, lying on its side with the head and caudal ends flexed upon the venter.

The entire operation of gathering the material for the cocoon and then enclosing itself within the same occupies from 45 minutes to one hour and 15 minutes, the act of entering the case generally consuming a little more than half of the time. Within two hours after the case is formed, the material is dry and of the characteristic grayish color, and cannot be distinguished from an older cocoon.

The most striking variation of the above described activities was revealed by an examination of one cocoon, out of several hundred torn open, in which two larvae were encased in the same cocoon. It is difficult to conceive just how the two were able to construct the case around themselves.

Another interesting incident observed was that of one larva attempting to appropriate the material which another larva had collected and out of which it was busy constructing its cocoon. This intrusion disturbed the original owner of the material, and it started to leave the mass. In so doing, it brushed against the other larva, and the latter moved away to gather its own supply elsewhere, while the disturbed larva resumed its cocooning labors.

The Gyrinids referred to in the above notes all belong to the genus Gyrinus, but the species have not yet been determined.

SOME NEW SCOLOPS (HOMOPTERA, FULGORIDAE) WITH NOTES ON OTHER SPECIES.

BY

PAUL B. LAWSON and R. H. BEAMER. *

Lawrence, Kansas.

Scolops socorroensis sp. n.

Figs. 5, 5a.

Close to **S. maculosus** Ball but more robust, cephalic process shorter and more slender and costal cell spotted with fuscous. Length from tip of cephalic process to tip of elytra 6mm. in female; 5mm. in male.

Cephalic process about as long as front, three-fourths as wide as vertex at sulcus, quite parallel sided for most of its length, dorsal carinae remarkably parallel clear to tip, median ventral carina stopping at sulcus. Elytra very broad, about length of abdomen.

Color: Greenish or straw yellow heavily spotted with black and brown. Cephalic process dark brown except for light ventral compartment and dorsal carinae. Vertex, pronotum and scutellum greenish yellow with the usual black spots; scutellum sometimes with additional spots along cephalic margin. Elytra straw yellow with large part of clavus and corium smoky, costal cell spotted with fuscous, veins distinctly alternately white and brown spotted, with several small and a large dark brown or black apical spots. Below greenish yellow washed with brown.

Male **holotype,** female **allotype,** a male and four female **paratypes** were all taken by the junior author in Socorro County, New Mexico, Aug. 18, 1927.

Types deposited in Snow Entomological collection except one paratype in Dr. Ball's collection.

Scolops neomexicanus sp. n.

Figs. 7, 7a.

Close to **S. socorroensis** sp. n. but larger, more elongate and with a shorter cephalic process. Costal cell spotted with fuscous. Length from tip of cephalic process to tip of elytra 6.5-7mm. in female; 6mm. in male.

Cephalic process as long as or slightly longer than

*Contribution from the Department of Entomology, University of Kansas.

front, nearly as wide as vertex at sulcus, tapering slightly from sulcus to tip, dorsal carinae gradually converging apically, median ventral carina stopping at sulcus. Elytra usually slightly exceeding abdomen.

Color: For the most part straw yellow, distinctly tinged with green especially on pronotum and scutellum; in general lighter than **S. socorroensis.** Cephalic process dark except for the pale ventral compartment and dorsal carinae. Vertex, pronotum and scutellum with the usual black spots. Tegulae dark brown. Elytra straw yellow, sometimes with large smoky areas, costal cell spotted with fuscous, veins distinctly alternately brown and white, apex with a number of dark spots. Below greenish yellow marked with brown.

Male **holotype,** female **allotype** and a series of **paratypes** were all taken by the junior author in Colfax County, New Mexico, Aug. 21, 1927. Additional paratypes were taken by the same collector in Las Animas County, Colorado, Sept. 22, 1927. Blue Springs, New Mexico, 1927; Culberson County, Texas, 1927; Apache County, Arizona, Aug. 16, 1927. Three other paratypes from Apache County, Arizona, were taken on the same day by Doctor P. A. Readio, and one paratype was taken by L. D. Anderson in Las Animas County, Colorado, Sept. 22, 1927.

Types deposited in Snow Entomological Collection except two paratypes in Dr. Ball's collection.

Scolops texanus sp. n.

Figs. 6, 6a.

Close to **S. neomexicanus** sp. n. but larger and with a stouter cephalic process. Costal cell spotted with fuscous. Length from tip of cephalic process to tip of elytra 7.5-8 mm. in female; 7 mm. in male.

Cephalic process as long or slightly longer than front, nearly as wide as vertex at sulcus, tapering slightly from sulcus to tip, dorsal carinae gradually converging apically, median ventral carina stopping at sulcus. Elytra moderately long, slightly exceeding abdomen.

Color: Straw yellow tinged with green; in general somewhat lighter than two preceding species. Cephalic process dark brown except for greenish dorsal carinae and ventral compartment. Vertex, pronotum and scutellum greenish brown with the usual black spots. Tegulae brown. Elytra yellowish brown, veins distinctly spotted with brown except sometimes for the tips of media and

cubitus, with four to six black spots in apical cells, the outer spots usually the largest. Below greenish brown spotted with fuscous.

Male **holotype,** female **allotype,** and a male and two female **paratypes** were all taken by the junior author at Valentine, Texas, July 13, 1927.

Types deposited in Snow Entomological Collection.

Scolops excultus sp. n.

Figs. 2, 2a.

A large reddish-brown species close to **S. grossus** but with an even larger cephalic process. Length from tip of cephalic process to tip of elytra 8 mm. in female; 7-7.5 mm. in male.

Cephalic process usually as long as front, very stout; wider than vertex at the sulcus, strongly inflated apically, practically parallel margined clear to apex, median ventral carina continuing on to apex of process. Elytra moderately long, somewhat exceeding abdomen.

Color: Distinctly reddish brown all over. Process, pronotum and scutellum definitely spotted with many white spots, and with carinae narrowly darker. Veins of elytra darker, spotted with white but not as distinctly as in **S. grossus.** Underside reddish brown, spotted all over with white spots especially on process and legs.

Male **holotype,** female **allotype** and two male **paratypes** taken by junior author in Taylor County, Texas, July 11, 1928.

This species along with **S. grossus** and **S. immanis** makes a group of three closely related species. It has the most extreme development of the cephalic process thus far found in the genus. **S. grossus** has a somewhat larger process than **S. immanis** and **S. excultus** has a process still larger. (See figures 1-3.)

Scolops (Belonocharis) californicus sp. n.

Figs. 4, 4a.

Close to **S. pallidus** but smaller, darker, distinctly spotted, and with a shorter and stouter cephalic process. Length from tip of cephalic process to tip of elytra 6.5-7.5 mm. in female; 6-7 mm. in male.

Cephalic process longer than front, three-fourths as wide as vertex at sulcus, distinctly narrowed apically, dorsal carinae gradually converging apically, median ventral carina stopping near sulcus but frequently con-

tinued on to process as a light line. Elytra as long as or slightly longer than abdomen.

Femora and tibiae of legs, especially of prothoracic legs, flattened to form characteristic of the subgenus.

Color: Straw yellow, distinctly spotted with dark brown. Cephalic process straw yellow, mottled with brown, with darker lines along lateral carinae and between dorsal carinae. Vertex, pronotum and scutellum straw yellow, pretty thoroughly mottled with brown except for larger yellow median area of scutellum. Elytra with veins distinctly alternated with white and brown, usually with larger dark spot on posterior half of claval suture and one or two large dark apical spots. Underside straw to greenish yellow, mottled with brown, particularly on the legs.

Male **holotype,** female **allotype,** and a large series of **paratypes,** all from Laguna Mountain, California, taken by the junior author on July 6, 1929. Additional paratypes were taken by the junior author in Orange County, California, on July 14, 1929.

Types deposited in the Snow Entomological Collection except two paratypes in Dr. Ball's collection.

Scolops (Belonocharis) pallidus var. **punctatus** var. n.

Size and form of **S. pallidus** but differing in color in that normally all the veins of the elytra are definitely spotted with dark brown, giving them a mottled appearance.

In Uhler's species the elytra vary greatly from a practically unmarked condition, through slight spotting, to a definitely striped appearance in the darker specimens in which there are dark stripes along the costal margin, between the sectors, and along the sutural margin. In all cases the outer branch of the first sector, or Sc plus R, and the third anal vein are light and unmarked, making two light stripes in between the three dark ones. In the variety **punctatus** there is no striped appearance, since all the veins of the elytra are rather evenly spotted.

Male **holotype,** female **allotype** and a large series of **paratypes** were taken by the junior author in the San Jacinto Mountains, California, July 21, 1929. Additional paratypes were taken at the same time and place by L. D. Anderson.

Types deposited in Snow Entomological Collection,

except two paratypes in Dr. Ball's collection.

Notes on Other Species.

Scolops maculosus. Known hitherto from Colorado and New Mexico. The writers have before them a very large series of this species from Coconino, Yavapai, Navajo and Apache Counties, Arizona.

Scolops pungens.

A series of specimens from Polk County Arkansas adds this state to the list from which this species has been secured.

Scolops angustatus

Specimens of this species are at hand from the following states from which it has not hitherto been recorded: Arizona, New Mexico, Texas.

Scolops vanduzei

A good series of this species is at hand from New Mexico and Texas from which states it has not previously been recorded.

Scolops snowi

A very large series of this species was taken by the junior autnor in Coconino county, Arizona, and in Zion National Park, Utah.

Scolops sulcipes

Specimems from Michigan add this state to the large number in which this species occurs.

Scolops fumidus

The Junior author took fifteen specimens of this species on Laguna Mountain and in Orange County, California, in the summer of 1929.

Scolops immanis

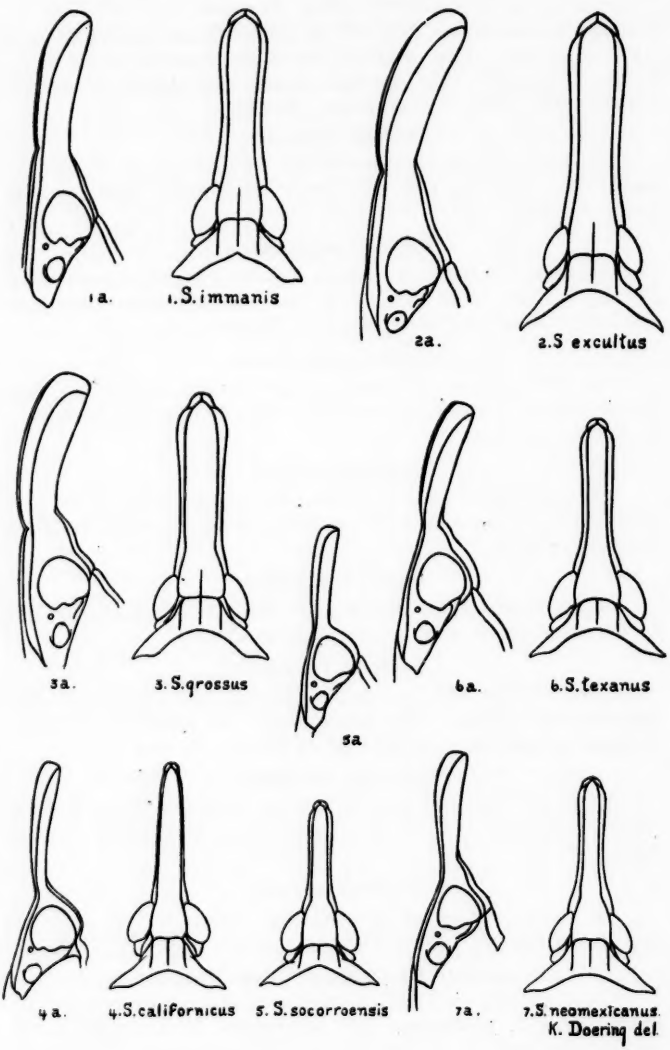
A good series of this species is at hand from Kenna, New Mexico, and two specimens from Roosevelt Co., N. Mex.

Scolops grossus

A large series of this species was taken by the junior author in Taylor County, Texas, July 11, 1928.

Correction Regarding Type Specimens

The holotype of **S. stonei** and the allotypes of **S. snowi** and **S. pruinosus** are deposited in Dr. Ball's collection instead of in the Snow Entomological Collection as previously reported.


1a.
1. S. immanis
2a.
2. S excultus
3a.
3. S. grossus
5a
6a.
6. S. texanus
4a.
4. S. californicus
5. S. socorroensis
7a.
7. S. neomexicanus.
K. Doering del.

NOTES ON THE GENUS APHELONEMA UHLER WITH DESCRIPTIONS OF NEW SPECIES.*

(Homoptera, Fulgoridae)

BY

RALPH W. BUNN, Lawrence, Kansas.

THE MALE GENITALIA

In examining the male genitalia of the available species of Aphelonema, the pygofer, the tip of the oedagus, and the claspers were found to afford distinct differentiating characters. This is shown quite clearly in the accompanying drawings. The differences found are briefly as follows:

A. simplex: Without a caudo-ventral process on the pygofer; claspers wide for most of their length then abruptly narrowed to the curved apex; tip of the oedagus rounded when viewed laterally, almost semi-circular, distinctly lobed and much larger than at base. Figs. 1, 1a.

A. convergens: Pygofer larger, with a small but distinct caudo-ventral process; claspers very slightly curved, foot-like, with a long toe; tip of the oedagus with a lip-like projection on the upper margin, distinctly lobed. Figs. 2, 2a.

A. rugosa: Caudal end of pygofer with a deep notch on ventral side forming a large distinct process at the apex; claspers wide at base and continuing with a wide gradual curve to the long slender apex; tip of oedagus knob-like, almost square in outline. Figs. 3, 3a.

A. bivittata: Pygofer similar to that of **A. rugosa** but process lying closer to main part of pygofer, only a narrow slit separating it from the main part; claspers with somewhat abrupt curves rather than the gradual curves of the preceding species; tip of oedagus somewhat lobed on lower margin, upper margin almost straight. Figs. 4, 4a.

These four species were all that were available for dissection. It is hoped that at a later date the other four species may be examined and the differences noted.

*Contribution from the Department of Entomology, University of Kansas.

KEY TO THE NORTH AMERICAN SPECIES OF **APHELONEMA** UHLER*.

A. Vertex short transverse, parallel margined. Front almost round, slightly inflated and inclined so as to be slightly visible from above. 1. **simplex** Uhler.

AA. Vertex almost as long or longer than pronotum. Front vertical or retreating slightly.

B. Vertex almost as long as pronotum. Front oval or elongate.

C. Front elongate, lateral carinae only slightly curved dorsum more or less striped with yellow or green and black.

D. Oblique lines arising under eyes converging at inside corner of elytra and not continuous with light stripe of abdomen 2. **convergens** sp. n.

DD. Light stripe of elytra continuous with light stripe of abdomen. 3. **bivittata** Ball.

CC. Front oval, flat, median carina strong.

D. Brachypterous elytra with a closely anastomosing net-work of veins. Angle of clypeus with a slight acute protuberance. 4. **rugosa** Ball.

DD. Brachypterous elytra with few simple veins.

E. Female not more than 2.1 mm. long. 5. **minuta** sp. n.

EE. Female 3 mm. or more in length. 6. **histrionica** Stal.

BB. Vertex long, five angular. Front inflated, retreating, broader than long, the pustular area much enlarged above.

C. Vertex longer than the pronotum, definitely angular. Front strongly retreating. 7. **nigriviridia** Ball.

CC. Vertex about equalling the pronotum in length, weakly angled. Front convex above, retreating below. 9. **viridis** Dozier.

Aphelonema convergens sp. n.

Similar to **A. bivittata** but oblique lines of elytra converging at meso-caudal angles and not continuous

*Adapted from key by Dr. Ball, Can. Ent., Vol. LVIII, p. 314, 1926.

with abdominal stripes. Length of female 3 mm.; of male 2—2.25 mm.

Vertex wider than twice its median length, weakly six-angled with front angles rounded and hind angles acute. Pronotum slightly longer than vertex, coarsely pustulate at the sides. Scutellum with coarse pustules laterad of the two distinct carinae. Elytra short, about half the length of the body, with few raised veins. Abdomen with a row of pustules on sides of each segment. Front distinctly longer than wide; lateral carinae distinct, somewhat curved; median carina very faint, fading out above; with two rows of pustules in each lateral compartment, the outer row extending down only about half way.

Color: Striped black and greenish yellow. Front greenish yellow with lateral carinae strongly black and pustules shading into black above; median light area of front continued slightly on to clypeus, the rest of which is dark. Vertex greenish yellow with two large posterior and sometimes two to four small anterior black spots. Pronotum greenish yellow with two small spots just caudad of large spots of vertex, and the pustules dark. Scutellum greenish yellow, margins black, lateral carinae and two broad stripes just mesad of them black; pustular area mottled with black. Elytra with lines on mesal margin and two broader oblique lines arising under the eyes converging at the mesco-caudal angle, greenish yellow, leaving two stripes close to the mesal margin and the lateral areas black. Each abdominal segment with a median and four lateral narrow yellow stripes; the median stripe tending to be continuous, but the lateral stripes broken at the caudal edge of each segment. A light ring around the anal tube. Eyes mottled gray and black. Legs reddish-yellow. Under side of abdomen black.

Genitalia: Last ventral segment of female large and wide, middle third of posterior margin distinctly produced into a lobe. Tip of male pygofer, claspers, and end of oedagus of characteristic shape as shown in Figs. 2 and 2a.

Holotype; female, taken in Cochise county, Arizona by Dr. R. H. Beamer, July 20, 1927: **Allotype;** male, taken in the same locality by Dr. Beamer July 29, 1927. **Paratypes;** a female and three males collected by Dr.

Beamer in Cochise County, Arizona, July 20, 1927; another male collected July 29, 1927; and two females and four males collected in Colfax County, New Mexico by Lauren D. Anderson, August 21, 1927. Types deposited in Snow Entomological Collection.

Aphelonema convergens var. **canyonensia** var. n.

A distinct yellow replaces the greenish yellow of the typical form. The two black stripes just mesad of the lateral carinae of scutellum wider and tending to be continued across the pronotum and vertex as a continuous stripe. Broader black stripe along lateral carinae of front. Length of female 2.5 to 2.75 mm:; male, 2 mm:

Holotype; female, from vicinity of Grand Canyon, Arizona collected by Dr. Beamer August 11, 1927. **Allotype;** male, collected at the same. time and place by Dr. Beamer. **Paratypes;** two females from Oak Creek Canyon, Arizona, taken August 14, 1927, and one female from Grand Canyon, Arizona, taken August 11, 1927 by Dr. P. A. Readio; three females from Grand Canyon, Arizona taken August 11, 1927 by L. D. Anderson; and six females from the same locality and collected at the same time by Dr. Beamer. Types deposited in Snow Entomological Collection.

Aphelonema minuta sp. n.

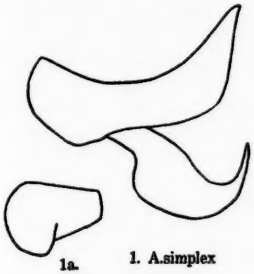
A yellowish-brown species somewhat resembling **A. histrionica** but much smaller. Length of female 2.1 mm.

Vertex inverted V-shaped, rather distinctly seven-sided, nearly three times as wide as its median length. Pronotum somewhat crescent-shaped, more than twice as wide as its median length, weakly pustulate on the lateral areas. Scutellum coarsely pustulate on the lateral areas. Subhyaline brachypterous elytra with few indistinct veins. Abdomen with a row of pustules on the sides of each segment. Front about as wide as long, barrel-shaped; lateral carinae very prominent and distinctly bowed; median carina distinct below, fading out above; lateral compartments with two rows of pustules, outer row extending down only about half way. A faint median carina extends across vertex, pronotum, and scutellum and is continued as a light narrow stripe across the abdomen.

Color: Yellowish brown. Vertex with two round darker spots, pronotum becoming darker laterally.

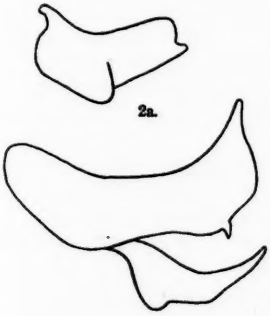
Three indistinct darker longitudinal stripes on each side of the abdomen, the pustules light. Eyes mottled with black. Area outside of lateral carinae of front much darker than median area. That part of clypeus adjoining front, and median carina which is continued downward as a keel, light; the rest of clypeus dark. Under side of abdomen dark brown. Legs yellowish brown.

Holotype; female, collected in Cochise county, Arizona, by Dr. R. H. Beamer, July 29, 1927. **Paratypes;** one female, same data as above, and another collected at the same place July 20, 1927.



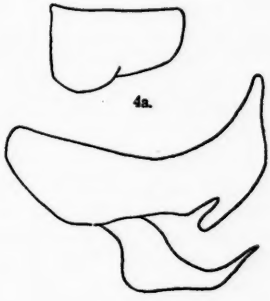
1a. 1. A.simplex

3a. 3. A.rugosa



2a.

2. A. convergens



4a.

4. A. bivittata

A NEW PARACOELIDIA (HOMOPTERA, CICADELLIDAE).*

BY

PAUL W. OMAN, Lawrence, Kansas.

Paracoelidia fusconeura n. sp.

A brownish species with a wide, darker median vitta; larger and darker than **Paracoelidia tuberculata** Baker. Length of male, 5.5 mm.; female, 7 mm:

Head narrower than pronotum, vertex of male much more obtusely angled than that of the female, both distinctly margined between front and disc, about as long as wide and slightly exceeding pronotum in length. Pronotum nearly two and one-half times as broad as long, anterior margin rounded, posterior margin angularly oncave, more so in the male than female, humeral margins longer than lateral margins. Scutellum large, wider than long. Elytra very long, strongly exceeding abdomen. Clypeus with a larger and more sharply pointed tubercle than in **P. tuberculata** Baker. Antennae exceedingly long, equalling length of body minus elytra. Valve of male hidden. Ventral plates united, broad basally, then tapering on posterior half to bluntly pointed apices which slightly exceed pygofer. Last ventral segment of the female very long, posterior margin shallowly concave between middle and lateral angles. Ovipositor very long, exceeding pygofer.

General ground color brownish, with darker median vitta arising on disc of vertex and extending across pronotum and scutellum. Elytra subhyaline, inner margins and apex slightly brownish. Male with first sector and branches all distinctly dark, female with first sector and branches dark except at apex. Costal margin narrowly dark. Wings with veins darkened. Tergum black, adding to the appearance of a dark, median vitta.

Besides differing from **P. tuberculata** Baker in its larger size, darker color, and more prominent tubercle, this species differs also in having a distinctly margined vertex and in the dark color of the costal margin and first sector of the elytra.

Holotype, male; Grand Canyon, Arizona; August 11, 1927, R. H. Beamer.

Allotype, female; same data.

Paratype, male; Flagstaff, Arizona; August 13, 1927, R. H. Beamer.

Types deposited in the Snow Entomological Collection.

NOTES ON KANSAS COLEOPTERA

By W. KNAUS, McPherson, Kansas.

The following are new Kansas locality records for species of the genus **Agrilus,** furnished by F. F. Crevecoeur, Onaga, Pottawatomie county. The greater part of Mr. Crevecoeur's collection of **Agrilus** is deposited in the museum of Ottawa University, Ottawa, Kansas.

9513 A. ruficollis (Fabricius).
9523 A. arcuatus (Say).
9517 A. defectus LeConte.
9505 A. obolinus LeConte.
9542 A. politus (Say).
9544 A. impexus Horn.
9539 A. otiosus Say.
9491 A. bilineatus (Weber).
9516 A. pusillus (Say).

These were all taken in the vicinity of Onaga, Kan.

In November, 1929, F. F. Crevecoeur of Onago, Ks. sent me several species of **Buprestidae** for identification. I was unable to identify a part of the sending and sent several specimens to W. S. Fisher of the National Museum at Washington. Among those identified by him was a specimen of **Ptosima walshi** Lec., described in 1863 from Ill. This species is so rare that the National Museum does not have a specimen. The species is, of course, new to the Kansas list of **Coleoptera.**

In the January, 1929 number of the Journal of the Kansas Entomological Society, I proposed a new name for the variety **Cicindela violocea** Fab. calling it **kansanus.** Dr. Walther Horn of Berlin, Germany, considers **kansanus** a synonym even though he has not seen the Fabricius type in the Paris Museum.

In a letter November 30, 1929 from F. F. Crevecoeur of Onaga, Ks., who collects the **violacea** variety of **sexguttata,** he says:- "I am inclined to think you are in the wrong on **C. kansanus.** I have on a number of occasions while collecting taken the green **sexguttata** in copula with **violacea,** in every case a male **sexguttata** with a female **violacea.** It was almost impossible to capture

both specimens when so observed but I once had a pair which I sent to someone in the east, to whom I have now forgotten. It seems to me if the violet colored ones were not a variety of **sexguttata** they would not pair with them. Then in your description of **C. kansanus** you say 'is of pure violet color, having no shade of green on either the dorsal or ventral surfaces.' I have one in my collection (which I do not care to part with) which is partly green on both dorsal and ventral surfaces. I have often when collecting seen specimens which while flying in the shade seemed to be **violacea** which when captured were not typical, being usually almost if not quite green."

On June 23rd, an employee of a local drug store that serves summer drinks and ice cream, brought me a large specimen of **Necrophorus americanus** (Oliv.) which he said had flown in the store, alighted on the Ice Cream counter, and immediately began feeding on a fragment of ice cream that had fallen on the counter. The proprietor of the store confirmed the observations of the attendant. This gives us a new slant on the appetite of the **Necrophorus** which is associated with and considered a carrion feeder.

THE ROCKY MOUNTAIN CONFERENCE OF ENTOMOLOGISTS

Fellow Entomologists:

The seventh annual meeting of the Rocky Mountain Conference of Entomologists will be held in Pingree Park, Colorado, August 18 to 23 inclusive. As in the past the meeting will be held at the Colorado Agricultural College Forestry Lodge and will be planned so that all members of the family may attend and enjoy themselves. The sessions for papers will be informal with ample time for discussion. We will be pleased to have subjects of papers at an early date.

To those that have not attended any of the previous meetings it might be said that bedding and meals are furnished at a prorated cost that has always been reasonable. Since the meeting place is more than 50 miles from Fort Collins, the nearest source of supplies, it is important that those arranging for the care of the crowd know in advance just how many expect to attend. Transportation to the park will be available for those not having their own cars.

Very truly yours,

GEORGE M. LIST, Secretary.

Fort Collins, Colorado.

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JOURNAL OF THE KANSAS ENTOMOLOGICAL SOCIETY

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NOTE

After January 1, 1930, Volume I, will be sold to those who wish it at $2.00 per volume. There are only a few complete sets of this volume in the hands of the Society.

Volume III, No. 3, July, 1930; Mailed July 1, 1930.